

# Ch 9 review

$$\begin{array}{r} 1) \quad 2x + 9y = 25 \\ - (4x + 9y = 23) \\ \hline -2x = 2 \\ x = -1 \end{array}$$

$$\begin{array}{r} 2(-1) + 9y = 25 \\ 9y = 27 \\ \frac{9y}{9} = \frac{27}{9} \\ y = 3 \end{array}$$

$$\boxed{(-1, 3)}$$

$$\begin{array}{r} 2) \quad -4x + 9y = 9 \\ x - 3y = -6 \\ x = -6 + 3y \end{array}$$

$$\begin{array}{r} -4(-6 + 3y) + 9y = 9 \\ 24 - 12y + 9y = 9 \\ -3y = -15 \\ y = 5 \end{array}$$

$$\begin{array}{r} x - 3(5) = -6 \\ x = 9 \end{array}$$

$$\boxed{(9, 5)}$$

$$\begin{array}{r} 3) \quad x + y = 1 \\ y = x^2 - 5 \end{array}$$

$$\begin{array}{r} x + x^2 - 5 = 1 \\ x^2 + x - 6 = 0 \\ (x + 3)(x - 2) = 0 \\ x = -3 \quad x = 2 \end{array}$$

$$\begin{array}{r} -3 + y = 1 \\ y = 4 \end{array}$$

$$\begin{array}{r} 2 + y = 1 \\ y = -1 \end{array}$$

$$\boxed{(-3, 4) \quad (2, -1)}$$

$$\begin{array}{r} 4) \quad y = x^2 - 6x + 3 \\ 2x + y = 3 \\ 2x + x^2 - 6x + 3 = 3 \\ x^2 - 4x = 0 \\ x(x - 4) = 0 \\ x = 0 \quad x = 4 \end{array}$$

$$\begin{array}{r} 2(0) + y = 3 \\ y = 3 \end{array}$$

$$\begin{array}{r} 2(4) + y = 3 \\ y = -5 \end{array}$$

$$\boxed{(0, 3) \quad (4, -5)}$$

$$\begin{array}{r} 5) \quad (x - 2y + z = -6) \cdot 3 \\ -x + 6y + 4z = 3 \\ (x + 5z = -12) \cdot 2 \end{array}$$

$$\begin{array}{r} 3x - 6y + 3z = -18 \\ + -x + 6y + 4z = 3 \\ \hline 2x + 7z = -15 \end{array}$$

$$\begin{array}{r} x + 5(-3) = -12 \\ x = 3 \end{array}$$

$$\begin{array}{r} + (-2x - 10z = 24) \\ \hline -3z = 9 \\ z = -3 \end{array}$$

$$\begin{array}{r} 3 - 2y - 3 = -6 \\ -2y = -6 \\ y = 3 \end{array}$$

$$\boxed{(3, 3, -3)}$$

$$\begin{array}{r} 6) \quad -2x + 3y + 5z = -21 \\ 6x - 3y = 0 \\ -4z = 20 \\ -4z = 20 \\ z = -5 \end{array}$$

$$\begin{array}{r} -2x + 3y + 5(-5) = -21 \\ -2x + 3y = 4 \\ + \frac{6x - 3y = 0}{4x = 4} \\ x = 1 \end{array}$$

$$\boxed{(1, 2, -5)}$$

$$\begin{array}{r} 6(1) - 3y = 0 \\ -3y = -6 \\ y = 2 \end{array}$$

$$\begin{aligned} 7) \quad & 4x - 3y + 6z = 25 \\ & x + 3y = -17 \\ & 3x = -6 \\ & x = -2 \end{aligned}$$

$$\begin{aligned} -2 + 3y &= -17 \\ 3y &= -15 \\ y &= -5 \end{aligned}$$

$$\begin{aligned} 4(-2) - 3(-5) + 6z &= 25 \\ -8 + 15 + 6z &= 25 \\ 6z &= 18 \\ z &= 3 \end{aligned}$$

$$\boxed{(-2, -5, 3)}$$

$$\begin{aligned} 8) \quad & (x - y + 4z = 5) \cdot 3 \\ & 4x + 3y - 2z = 5 \\ -10(2x + z = 2) \end{aligned}$$

$$\begin{aligned} & 3x - 3y + 12z = 15 \\ & + (4x + 3y - 2z = 5) \\ & \hline & 7x + 10z = 20 \\ & + (-20x - 10z = -20) \\ & \hline & -13x = 0 \\ & x = 0 \end{aligned}$$

$$\begin{aligned} 2(0) + z &= 2 \\ z &= 2 \end{aligned}$$

$$\begin{aligned} 0 - y + 4(2) &= 5 \\ -y &= -3 \\ y &= 3 \end{aligned}$$

$$\boxed{(0, 3, 2)}$$

$$\begin{aligned} 9) \quad & -3x + 3y = 4 \\ & 3(x - y = -3) \end{aligned}$$

$$\begin{aligned} -3x + 3y &= 4 \\ + (3x - 3y = -9) \\ \hline 0 &= -5 \end{aligned}$$

no solutions :)

$$\begin{aligned} 10) \quad & C = 50,000 + 12x \\ & P = 25x \\ & 25x = 50,000 + 12x \\ & 13x = 50,000 \\ & x = 3846.154 \end{aligned}$$

x = # of kits

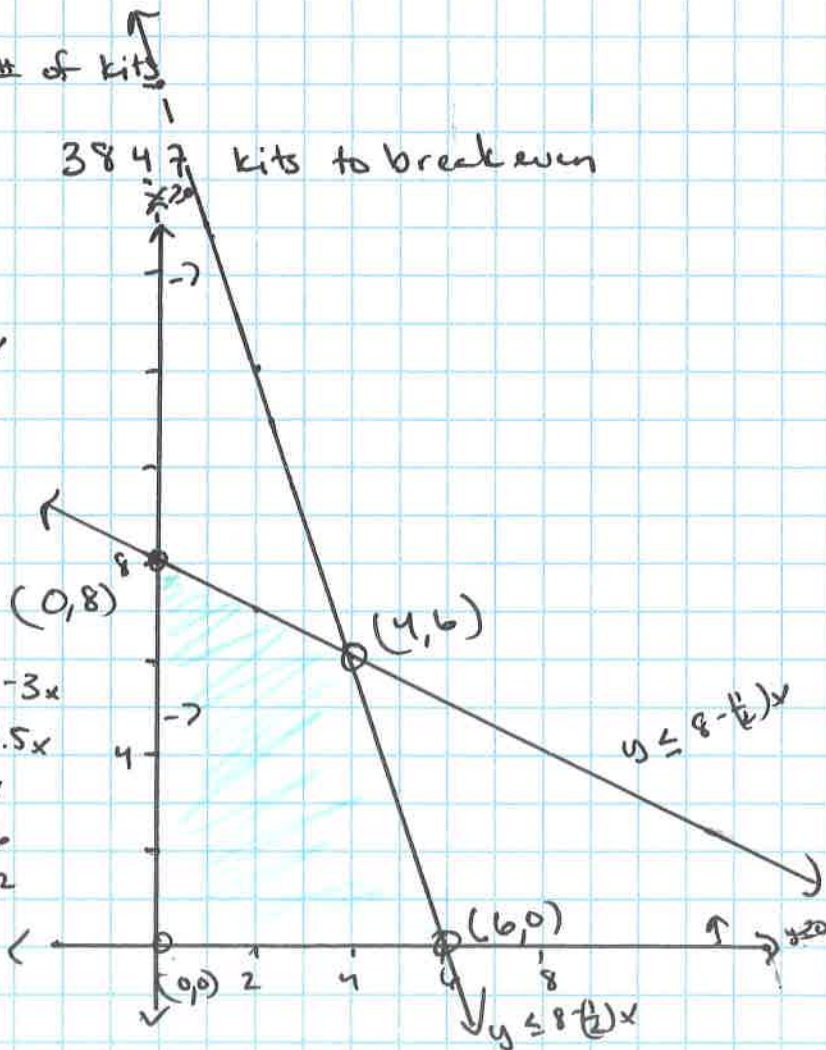
3847 kits to break even

$$\begin{aligned} 11) a) \quad & x + 2y \leq 16 \\ & 3x + y \leq 18 \\ & x \geq 0 \\ & y \geq 0 \\ & 0 + 0 \leq 16 \checkmark \\ & 0 + 0 \leq 18 \checkmark \end{aligned}$$

$$\begin{aligned} y &\leq 8 - \left(\frac{1}{2}\right)x \\ y &\leq 18 - 3x \end{aligned}$$

$$\begin{aligned} 0 + 2y &= 16 \\ y &= 8 \\ (0, 8) \\ 3(x) + 0 &= 18 \\ 3x &= 18 \\ x &= 6 \\ (6, 0) \end{aligned}$$

$$\begin{aligned} 8 - \frac{1}{2}x &= 18 - 3x \\ -10 &= -2.5x \\ 4 &= x \\ 4 + 2y &= 16 \\ 2y &= 12 \\ y &= 6 \\ (4, 6) \end{aligned}$$





$$11b \quad \begin{aligned} 2x - 3y &\geq 0 \\ 2x - y &\leq 8 \\ y &\geq 0 \end{aligned}$$

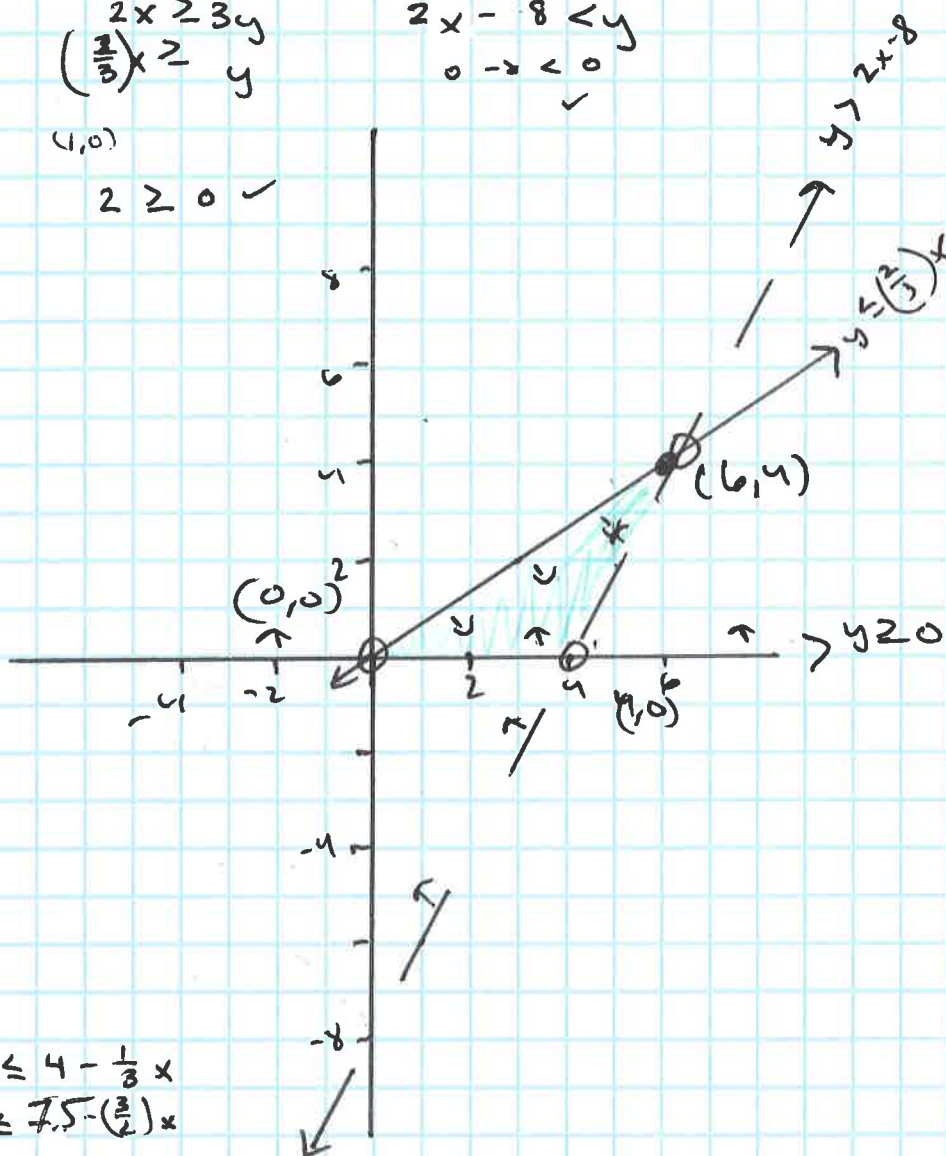
$$\begin{aligned} 2x &\geq 3y \\ \left(\frac{2}{3}\right)x &\geq y \\ (4,0) \\ 2 &\geq 0 \checkmark \end{aligned}$$

$$\begin{aligned} 2x - 8 &\leq y \\ 0 - 8 &\leq 0 \checkmark \end{aligned}$$

$$\begin{aligned} 2x - 8 &= 0 \\ 2x &= 8 \\ x &= 4 \\ (4,0) \end{aligned}$$

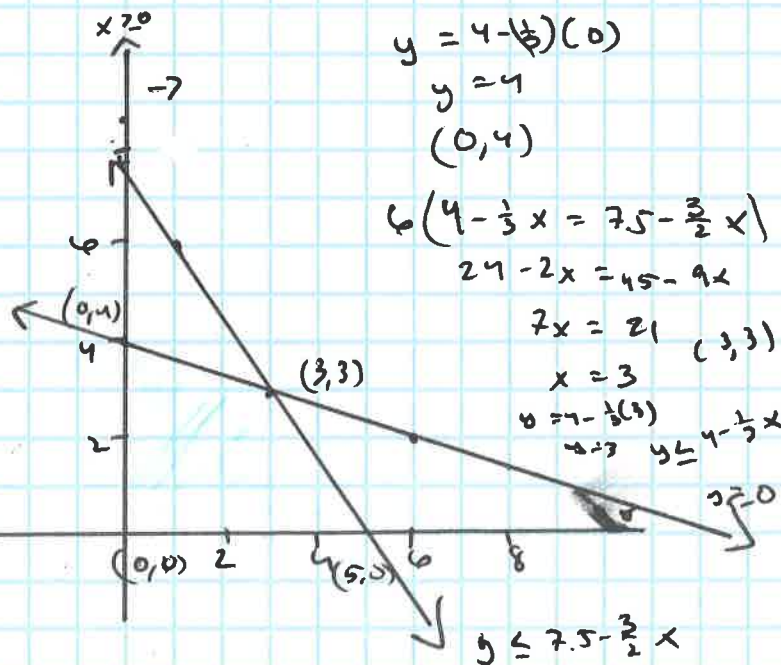
$$\begin{aligned} 3 \left( 2x - 8 = \left(\frac{2}{3}\right)x \right) \\ 6x - 24 &= 2x \\ -24 &= -4x \\ 6 &= x \end{aligned}$$

$$\begin{aligned} 2(6) &= 3y \\ 4 &= y \\ (6,4) \end{aligned}$$



$$12 \quad \begin{aligned} x + 3y &\leq 12 & y &\leq 4 - \frac{1}{3}x \\ 3x + 2y &\leq 15 & y &\leq 7.5 - \frac{3}{2}x \\ x &\geq 0 & y &\geq 0 \end{aligned}$$

|         | $5x + 11y$     |          |
|---------|----------------|----------|
| $(0,4)$ | $5(0) + 11(4)$ | 44       |
| $(3,3)$ | $5(3) + 11(3)$ | 48 — max |
| $(5,0)$ | $5(5) + 11(0)$ | 25       |
| $(0,0)$ | $5(0) + 11(0)$ | 0 — min  |



$$\begin{aligned} y &= 4 - \frac{1}{3}(0) \\ y &= 4 \\ (0,4) \end{aligned}$$

$$\begin{aligned} 6 \left( 4 - \frac{1}{3}x = 7.5 - \frac{3}{2}x \right) \\ 24 - 2x &= 45 - 9x \\ 7x &= 21 & (3,3) \\ x &= 3 \\ 0 &= 7.5 - \frac{3}{2}(3) \\ 0 &\leq 4 - \frac{1}{3}x \\ 0 &\geq 0 \end{aligned}$$

13 | a. let  $x = \text{shorts}$   
 $y = \text{tank tops}$

$$\text{Profit: } 12x + 8y$$

$$\text{constraints: } \begin{aligned} x &\geq 0 \\ y &\geq 0 \end{aligned}$$

$$\begin{aligned} 2x + 1.5y &\leq 25 \\ 4x + 3y &\leq 35 \end{aligned}$$

b. model A =  $x$   
model B =  $y$

$$\begin{aligned} 2x + 2.5y &\leq 4000 \\ 4x + y &\leq 4800 \\ x + 1.75y &\leq 1500 \end{aligned}$$

$$\begin{aligned} x &\geq 0 \\ y &\geq 0 \end{aligned}$$

$$\text{Profit: } 45x + 50y$$